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## GERMAN PATENT OFFICE

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## DISPOSABLE DIAPERS

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### Abstract

A disposable diaper, comprising an exterior liquid-impermeable layer, a liquid-absorbing intermediate layer, and a liquid-permeable lining, characterized by the fact that the lining comprises one or more substances selected from the group consisting of lubricants, hydrophobic substance, pH-lowering agents, disinfectants, bacteriostatic agents, and substances which cure, relieve, or soothe diaper dermatitis.

### Description

The invention under consideration concerns disposable or expendable diapers. In particular, the invention under consideration concerns those diapers in which the layer which is in contact with the skin (designated below as "lining") comprises a skin-protective substance or a substance with which diaper dermatitis can be treated--that is, can be cured, alleviated, or soothed. Diaper dermatitis (also known as "diaper rash") is a skin irritation which is produced by skin wetness, caused primarily by urine.

Disposable diapers are used throughout the whole world, and particularly in developed countries, they are frequently used.

One disposable diaper comprises an external liquid-impermeable layer, a liquid-permeable lining, and a liquid-absorbing intermediate layer. As is known, the use of such diapers regularly leads to diaper dermatitis.

One of the main factors which lead to diaper dermatitis is skin wetness, which is formed by urine, which is enclosed on the skin, increasing its coefficient of friction and leading to increased abrasion and injuries due to friction wounds. Wet skin also has a higher permeability, which facilitates a penetration of irritating substances and leads subsequently to the growth of microorganisms. These microorganisms comprise bacteria which can produce ammonia from urea, which brings about an increase in the pH value of the surface of the skin. Such a rise in the pH value itself has an irritating effect on the skin and is consequently an additional factor in causing diaper dermatitis.

In disposable diapers on the market, the wetness of the skin is reduced by the inclusion of a high-absorbing intermediate layer in the diapers. Such a layer generally comprises a cellulose material--perhaps in combination with super absorbing polymers (SAP), which are produced from a crosslinked sodium polyacrylate--which has the capability of absorbing several times its own weight in liquid. SAP, which is a powder material, and which is added to the intermediate absorbing core (the intermediate layer), also exhibits a certain pH buffer capacity and thus prevents an uncontrolled rise in the pH value. Since, however, the SAP is not in contact with the skin, the buffering is not always sufficient, so as to prevent a rise in the pH value of the skin.

The possibilities available today of reducing diaper dermatitis are therefore not always satisfactory, and better and more efficient agents are desirable.

Therefore, it is the goal of the invention under consideration to make available an improved disposable diaper, which reduces the appearance and the severity of diaper dermatitis, in comparison with the disposable diapers of the state of the art.

In particular, the goal of the invention under consideration is to make available a disposable diaper in which the liquid-permeable lining comprises a substance that can prevent or reduce the appearance of diaper dermatitis.

The invention is based on a new concept in accordance with which diaper dermatitis is relieved and its appearance is considerably reduced, by providing the lining with a skin-protective substance or a substance which can treat such skin injuries.

Accordingly, the invention under consideration makes available a disposable diaper which comprises an external liquid-impermeable layer, a liquid-absorbing intermediate layer, and a liquid-permeable lining, characterized by the fact that the lining comprises one or more substances which are selected from the group consisting of lubricants, hydrophobic substances, pH-lowering agents, disinfectants, bacteriostatic agents, and substances which can cure, relieve, or soothe diaper dermatitis.

The disposable diapers in accordance with the invention are conceived for use with children as well as adults who suffer from bladder-control problems.

Nonlimiting samples for the substances are listed below in accordance with their function and they comprise:

lubricants such as silicone, raw vaselines, sorbitan oleate, polydimethylsiloxane, mineral oil and silicon dioxide;

hydrophobic substances such as lanolin, jojoba oil, paraffin oil, raw vaselines, beeswax, wool fat, wool alcohols, acetylated wool alcohols, mineral oil, and Peru balsam;

a pH-lowering agent such as citric acid;

disinfectants such as phenethyl alcohol, dichlorobenzyl alcohol, Preventol-RB50 and propylhydroxybenzoate;

bacteriostatic agents such as sorbitan, dichlorobenzyl alcohol, citric acid, and propylhydroxybenzoate;

skin-rash-soothing substances such as aloe vera gel, jojoba oil, chamomile, propylene glycol, allantoin, glycerol, cetyl alcohol, and starch;

skin-rash-curing and relieving agents such as lanolin, aloe vera gel, paraffin oil, raw vaselines, zinc oxide, panthenol, sorbitan, monoisostearate, chamomile, azulene, propylene glycol, allantoin, wool fat, glycerol, wool alcohols, acetylated wool alcohols, Peru balsam, collagen, and sea algae extracts;

and other materials with similar characteristics as those mentioned above.

The substances can be contained in various forms in the lining. For example, they can be applied on the lining, or can be added to the lining in the form of a curative salve, a salve, a liquid, a cream, or a gel, and in general, in any known form suitable for such an application.

The substances can be introduced into the starting lining material--in particular before its use in the production of

diapers. Alternately, the substances can be introduced into the lining after the production of the diapers. The introduction can be carried out, for example, by spraying, roller coating, stamping, or pressing.

In the diapers in accordance with the invention, the substances can be introduced into the entire surface of the lining or only in one part thereof, including and especially in the crotch area and some other skin areas which tend to develop skin dermatitis.

#### Claims

1. Disposable or expendable diapers, comprising one external liquid-impermeable layer, one liquid-absorbing intermediate layer, and one liquid-permeable lining, characterized by the fact that the lining comprises one or more substances selected from the group consisting of lubricants, hydrophobic substances, pH-lowering agents, disinfectants, bacteriostatic agents and substances which can cure, relieve or soothe diaper dermatitis.

2. Disposable diapers according to Claim 1, characterized by the fact that the substance is a lubricant selected from the group consisting of silicone, raw vaselines, sorbitan oleate, polydimethylsiloxanes, mineral oil and silicon dioxide.

3. Disposable diapers according to Claim 1, characterized by the fact that the substance is a hydrophobic substance, selected from the group consisting of hydrophobic compositions, such as lanolin, jojoba oil, paraffin oil, raw vaselines,

beeswax, wool fat, wool alcohols, acetylated wool alcohols, mineral oil, and Peru balsam.

4. Disposable diapers according to Claim 1, characterized by the fact that the substance is a pH-lowering agent, namely citric acid.

5. Disposable diapers according to Claim 1, characterized by the fact that the substance is a disinfectant selected from the group consisting of phenethyl alcohol, dichlorobenzyl alcohol, Preventol-RB50 and propylhydroxybenzoate.

6. Disposable diapers according to Claim 1, characterized by the fact that the substance is a bacteriostatic agent selected from the group consisting of sorbitan, dichlorobenzyl alcohol, citric acid, and propylhydroxybenzoate.

7. Disposable diapers according to Claim 1, characterized by the fact that the substance is a soothing substance selected from the group consisting of aloe vera gel, jojoba oil, chamomile oil, propylene glycol, allantoin, glycerol, cetyl alcohol, and starch.

8. Disposable diapers according to Claim 1, characterized by the fact that a wound-curing or alleviating agent, selected from the group consisting of lanolin, aloe vera gel, paraffin oil, raw vaselines, zinc oxide, panthenol, sorbitan, monoisostearate, chamomile oil, azulene, propylene glycol, allantoin, wool fat, glycerol, wool alcohols, acetylated wool alcohols, Peru balsam, collagen, and sea algae extracts.